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June 8, 1998

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
Room 2222, Mail Stop 1170
1919 M Street, N.W.
Washington, DC 20554

Re: RM- 9157 - *Ex Parte*

Dear Ms. Salas:

On June 5, 1998, I made an *ex parte* presentation in the above-referenced matter to Mr. Eugene Thomson of the Public Safety and Private Radio Division of the Wireless Telecommunications Bureau. I followed up that conversation with the enclosed letter submitted today.

Please contact me if there is any question concerning this matter.

Sincerely.

David E. Hilliard

David E. Hilliard
Counsel for Medtronic, Inc.

cc: Mr. Eugene Thomson (w/ encl.)
Enclosures: Letter of June 8, 1998, to Mr. Eugene Thomson

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June 8, 1998

Via Facsimile & Hand Delivery

Mr. Eugene Thomson
Public Safety & Private Wireless Division
Wireless Telecommunications Bureau
Federal Communications Commission
Room 8010, 2025 M Street, N.W.
Washington, DC 20554

Re: RM-9157 - *Ex Parte*

Dear Mr. Thomson:

This responds to your question as to the suitability of the 402 - 405 MHz band for propagation of radio signals to and from a transceiver contained within a medical implant such as a cardiac pacemaker or defibrillator that has been implanted within a human body. The appropriateness of the 402 - 405 MHz band is the result of a combination of qualities and not solely inherent characteristics of the band, although the latter are clearly important.

Propagation Through Tissue. The rationale for the use of this spectrum was explored in the deliberations of U.S. Working Party 7C during 1996 and 1997, which ultimately led to ITU-R Recommendation SA 1346 (02/98), "Sharing Between the Meteorological Aids Service and Medical Implant Communications Systems Operating in the Mobile Service in the Frequency Band 401 - 406 MHz." As part of its participation in U.S. WP 7C, Medtronic presented the results of research that showed the conductivity of body tissues and fluids severely reduced the implanted device's antenna performance. Medtronic determined that an antenna with a gain of approximately -30 dBi is about the best that can be attained. Additional losses come from reflection at the air-tissue boundary and plane wave attenuation in the media (*i.e.* both in tissue and in air). Medtronic presented the graph reproduced in the enclosure as Figure 1. It shows that tissue loss increases with frequency and that reflection losses decrease with frequency. If only propagation through tissue were concerned, however, the *most* desirable band would be lower than the 402 - 405 MHz band even though this band exhibits good propagation characteristics. Medical implant transceivers, however, must contend with other constraints that affect the choice of spectrum.

Component Size. The devices must be small – a few cubic centimeters at most. Practical components such as SAW (surface acoustic wave) filters are available at frequencies in

250 - 450 MHz range. The availability of such components also works in favor of use of spectrum in the lower portion of the UHF region.

Power Consumption. The devices must make efficient use of the available battery power that exists primarily for therapeutic purposes rather than communications and which must last upwards of ten years. As Figure 2 from the materials provided to U.S. WP 7C shows, power drain increases with frequency.

RF Noise Considerations. Systems of this kind should use frequencies on which there is a relatively small amount of both manmade and natural radio noise, in order to avoid using precious battery power to overcome the noise through higher power and/or longer transmit times. This ruled out the sharing of spectrum with television broadcast stations, the use of existing land mobile bands, and even the use of those bands favored under the FCC Rules for unlicensed (Part 15) operations. Thus, the spectrum proposed needed to be spectrum shared with systems that would generally be compatible with the medical implant operations.

International Compatibility. The spectrum chosen needs to be available on an international basis so that those who will have medical implant communications transceivers included within their medical implant devices will be assured of reasonable compatibility and probability of use in countries around the world. The 402 - 405 MHz band fulfills this requirement given the international compatibility efforts undertaken to date.

In short, the 402 - 405 MHz band appears to be the best, if not the only, spectrum that meets all of these conditions. Accordingly, it is not solely the good tissue propagation characteristics of the 402 - 405 MHz band that recommend it for this purpose, but also the availability of right sized components, the feasibility of low power drain, the relatively noise free environment, and the high likelihood of international compatibility that make the 402 - 405 MHz band so desirable for use in the Medical Implant Communications Service.

Please call me if you have any questions regarding this matter. Medtronic urges the Commission to move forward to issue a notice of proposed rule making in response to its petition.

Respectfully

David E. Hilliard

David E. Hilliard
Counsel for Medtronic, Inc.

Enclosure
cc: Office of the Secretary, FCC

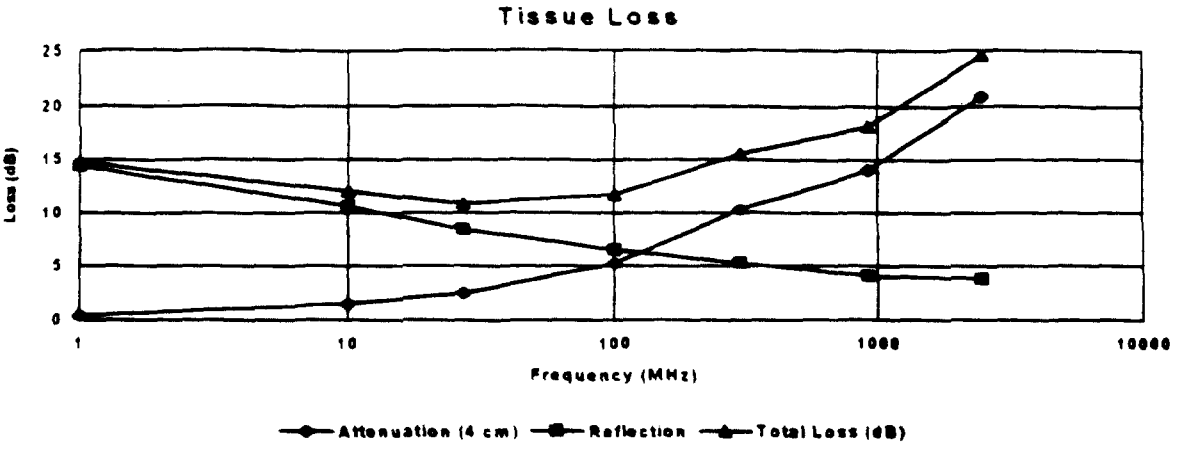

Figure 1

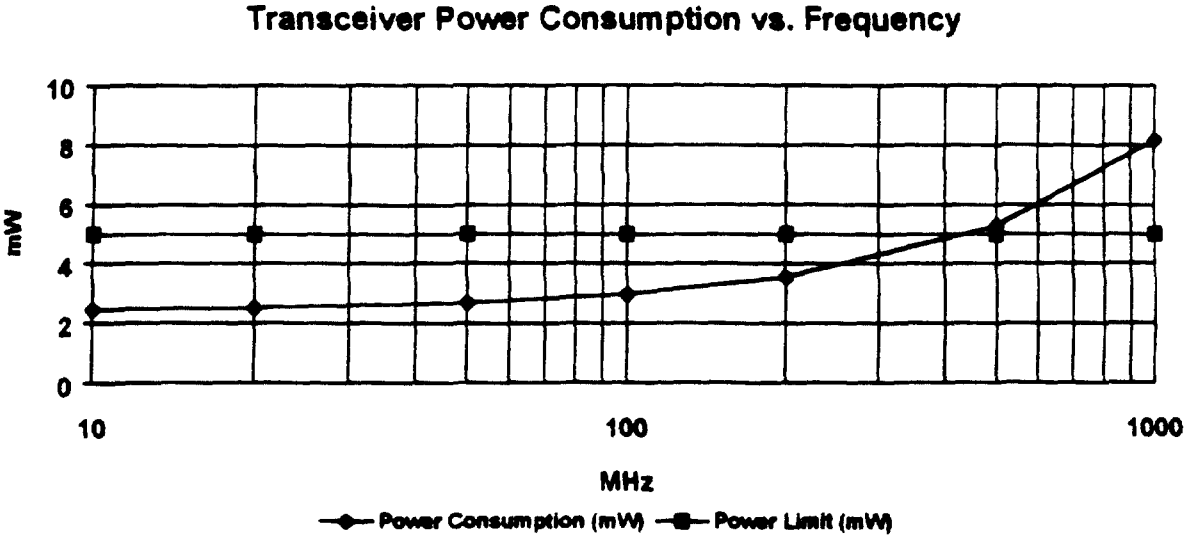

Figure 2